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ABSTRACT

This report (1) describes the development of libraries in China: (2) examines Chinese library, documentation, and scholarly publications from a historical perspective; and (3) outlines the present state of the art as reflected by the situation before and after the Cultural Revolution. The history of public libraries, university and school libraries, research libraries, trade union libraries, factory libraries, military libraries, information agencies, and a national library association is outlined. The influences of Chinese characters on present day scientific and technical information is explored, as are Chinese classification schemes and the Chinese library tradition. Discussions of the growth of education, the importance of radio and television, and the training of librarians are also included, followed by a brief bibliometric study of how Chinese scientists utilize their information sources. Most of the 48 sources listed in the bibliography are either in English or a Scandinavian language. (FM)

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A NOTE ABOUT CHINA'S SCIENTIFIC AND TECHNOLOGICAL INFORMATION SYSTEM

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ABSTRACT

Starting from China's determination to carry through the Four Modernisations which involve libraries, documentation centres, scholarly publications and international exchanges, the report describes the various types of libraries in China. It looks on the subject also from a historical perspective, describing the implications of the Chinese characters on present day scientific and technical information, the library tradition and the classification schemes which have been used.

The present state-of-the-art is reflected by the situation before and after the Cultural Revolution. The prospect for the future depends on the growth of education and mass communication means. Finally, a bibliometric approach is made in order to evaluate in a specific field such as computers, how close to the international research frontier Chinese researchers are. Much of the material presented stems from a visit to China by a delegation from the Swedish Academy of Sciences. Includes a four pages bibliography.

撮要

本文描述自決定推行四個現代化以來中國的圖書館事業。圖書館，文獻處理中心，學術刊物和國際學術情報交流是推行四個現代化的一環。本文又從歷史觀點去討論漢字對今日科技情報的影響，敘述圖書館事業的傳統和所採用的圖書分類法。

從文化大革命前後的情況可以體會到目前圖書館專業技術的水平。將來的發展則要看教育和大衆傳播媒介的增長而定。最後，作者以書籍爲尺度去衡量中國研究人員在一個特定學科範疇內，例如電子計算機，與國際尖端水平的差距。

本文資料大部分是取自瑞典科學院代表團到中國的一次訪問。文後附有四頁參考書目。

Translated by Mr Foo Kwok-wah, Senior Assistant Librarian,
Hong Kong Polytechnic Library.

TABLE OF CONTENTS

1. LIBRARY DEVELOPMENT 7

1.1	Public Libraries	8
1.2	University and school libraries	14
1.3	Research libraries	17
1.4-1.5	Trade Union libraries and factory libraries	19
1.6	Military libraries	19
1.7	Other information agencies	20
1.8	The establishment of a library association	22

2. LIBRARY, DOCUMENTATION AND SCHOLARLY PUBLICATIONS IN THE HISTORICAL PERSPECTIVE 23

2.1	Implications of the Chinese characters on the present scientific and technical information	23
2.2	The library tradition - a summary	25
2.3	Classification	30

3. PRESENT STATE OF THE ART AS REFLECTED BY THE SITUATION BEFORE AND AFTER THE CULTURAL REVOLUTION 31

3.1	Review of growth of education	31
3.2	The importance of radio and television	38
3.3	Training of librarians	39

4. A BIBLIOMETRIC APPROACH 42

5. REFERENCES 47

1. LIBRARY DEVELOPMENT

The 'Four Modernizations'-campaign is supposed to go on until the year 2000. That great plan to bring China up-to-date will also vitalize and influence the future of China's libraries and remedy part of the damages made to the knowledge resources during the years of the Cultural Revolution. If the present economic climate is sustained, provided that we do not overestimate the resources available, we may expect a rapid development and significant changes in the field of library and information services.

Even if China will encounter many difficulties, we can witness certain optimism in the field, expressed by Mr Pao, librarian at the Beijing National Library, thus: "It is much easier to be the director of a library in a socialist country than in a capitalist one, because education and libraries are given a higher priority". (Symo 78). However, if China's development policy should prove successful, the modernization of the information services will have to follow more or less the pattern already developed in the industrialized countries.

After the fall of the Gang of Four the policy to enhance education and science has been explicitly stated, also involving the libraries. In order to understand the forces behind the expected development, we have to identify the organizations to which the libraries belong. We can distinguish six different types of libraries, responsible to various authorities or organizations (Ells 80):

1) Public libraries, operated by the State Administration Bureau of Museums and Archeological Data. To this group belongs also the Beijing National Library.

2) University and school libraries as part of the academic or educational authority to which they belong. Thus, some of these libraries fall under the Ministry of Education, Ministry of Culture, or Ministry of Defence, a.s.o. The school libraries are run locally by the province authorities.

3) Research libraries answer to their parent research organizations which are under the Central Government, e.g. the Academy of Sciences, the Academy of Social Sciences, or other academies in special research fields.

4) Trade union libraries, and

5) Factory libraries which are run by the parent organizations.

6) Military libraries operated by the military branches and the state administration.

1.1 Public libraries

The National Library of Beijing. Of all the public libraries the National Library of Beijing is the largest. It was rebuilt in 1931, but the main building which was worn down went through radical restauration which terminated in 1979. The main building has been interconnected with new buildings during the years, and the latest addition of 75,000 m^2 is now under construction. It will be a modern building furnished with new electronic devices.

The present operations are handled along traditional lines and they are of low efficiency. There are 15 reading rooms where 700 readers can be accommodated. Daily, thousands of users crowd up the hallway, corridors and reading rooms. Mostly they are scientists and researchers who frequently use the collections. (Tell 79) In contrast to many countries under development, China has a well developed network for interlibrary loans, and the National Library provides a loan service to libraries throughout

the country. Everyone who is a registered borrower is allowed to borrow up to five books at a time for a month. (Eide 78, Amer 80)*

In 1978 the library had a staff of 700 of which two-thirds were graduates. Of these some have supplemented their academic degree in a subject by library qualifications. The non-academic part of the staff have passed high-school and then got on-the-job-training, in some cases in the form of seminars in the library. (Symo 78)

The work on the National bibliography was cut off in 1966, and restarted in 1972, but only on a limited scale and without dealing with the backlog accumulated in various fields. Until present time no copies of it have been made available to foreign countries. The only source of information about new publications are the lists of publications offered on exchange by the National Library. In 1980 these lists are published monthly and contain around a hundred publications in each issue.

The library is entitled to receive three copies of all publications in the country as legal deposit. The production of scientific literature during the years 1949 to 1976 can be divided into three stages:

1. 1949-1959 the golden age of publishing
2. 1959-1966 a period of consolidation
3. 1966-1976 an obscure period

The following is a brief description of the last period. It was widely believed that from 1966 to the end of 1970 only works promoting Mao Zedong's thoughts were published. Not until 1973 it was learnt that works on science and technology really were published. From 1971 there started a slow normalization of China's publishing activities,

*All statistics is highly speculative. This is valid for all figures in this paper.

although quality and quantity were poor. A publishers' conference organized in March 1971 stressed the aim of only serving the workers, peasants and soldiers. The official attitude towards publishing in these years called for more popular readings of high school standard. The greater part was anonymous, many conveying as author 'the editorial committee', because of the political uncertainty. (Chan 78) Contrary to the two first periods above, when Beijing was the publishing centre for the whole of China, the publishing activities were now decentralized.

Chinese scientific and technological literature forms a great part of the bulk of the world's literature. Its scientific standard is often high, why efforts should be made to embody this literature with the world's general flow of scientific-technological publications.

Russian scientific-technical literature has during the last decade been incorporated in the literature that scientists and technicians ordinarily use. New ideas from China ought to be treated in a similar manner, although only a small part of this kind of Chinese literature is obtainable and is also varying as it is subject to arbitrary governmental control.

International co-operation might introduce improvements and should be encouraged in order to utilize this literature. (Tell 66)

The National Library comprises around 10 million volumes, mainly in the field of natural and social sciences, and the strength is in the latter ones. Up to 1949 the collections had grown to 1.4 million volumes, mainly by additions of Chinese publications. (Amer 80) It was first

after 1949 that books and journals in Western languages were collected. Now all languages and subjects are represented.

The acquisition of foreign literature consists to one third of material received through exchange with around 2,000 foreign institutions in 119 countries. All other foreign material is bought for the library by the special Chinese agency responsible for the purchase of foreign publications, China National Publications Import Corporation (CNPIC) in Beijing. CNPIC was originally a department within the International Bookshop that was established in 1949. It became independent in 1964 and was reorganized in 1978 when the activities were divided on four departments importing from different parts of the world. The department for Western Europe is now buying from 22 countries. Within China CNPIC has 28 local bookstore organizations for the distribution of foreign publications. (Ells 80)

The number of current periodicals is around 11,000 of which four fifths are foreign. Due to limited space in the reading rooms only a few hundred of the periodicals can be exhibited for browsing. Most of the journals primarily in Chinese are exhibited in the social science reading room.

The catalogue in two parts, one for Chinese books and one for works in the Western languages, covers only the collection which is housed in the main library, i.e. about 3 million volumes (1979). The rest is found in separate catalogues which are kept in depository libraries outside the central unit. A visitor to the main library has, thus, access only to one third of the collection. If he wants some works besides the main

collection, he has to find out by himself through visits to the various deposit libraries.

The main library stores works published during Qing (1644-1911) and the period after the liberation (1949-). A collection which is 'not formally catalogued', i.e. mostly gifts, is catalogued separately. (Ells 80)

As in other fields also the library is rapidly developing when it comes to the new technology. The policy is to improve the library services through automation, to develop national library networks and to increase the staff by hiring formally trained librarians as they become available. There is an understanding to integrate theory and practice in library work in order to improve the library situation for the vast majority of the Chinese people as quickly as possible.

The National Library is essentially a research library. It has a vast collection of microfilms and its own microfilm unit. Microfilm or photocopies are often substituting inter-library loans. (Symo 78)

In contrast to many libraries, the National Library was not badly damaged during the Cultural Revolution, the only harm was that books written by 'revisionists' had their author names deleted. In order to limit the damages in libraries by the Red Guards the central authorities protected the National Library, as it seemed.

Some sources even mention an increase in the collections during the revolution, as many people donated books they did not dare to keep to the National Library. A former Red Guard has revealed:

- The one thing the general public abroad could not forgive China was that the authorities encouraged Red Guards to 'destroy the four ancients', thereby destroying China's cultural heritage. Actually, we did not destroy it - we rushed into the National Library and confiscated the books which we then read in private ... The fervor with which the Red Guards devoured books had to be seen to be believed. Because it was forbidden to read the banned books in public, we established underground libraries where we circulated our books and discussed problems ... - (Oufa 79)

The National Library is not only the biggest and richest library, but it serves also as a guiding and supervising instance for the greater part of China's libraries. It is a matter of fact that it has a leading role within research and education. This is certainly due to Mao Zedong's influence. During 1918-1919 he was library assistant at the University Library of Beijing under Li Dazhao. His room in the red house, Hong Lou, is still preserved. Shortly afterwards Mao organized a community library in Hunan. (Will 61)

The Shanghai Library is the second largest with more than six million books (1979). It has a staff of 545, and services are offered to the general public, researchers and children. There are over 41,000 registered borrowers. The daily circulation is over 6,500 works.

Since Shanghai is an industrial city, the collections are strong in science and technology. There are a number of reading rooms and a large display area that continously hosts exhibitions on such topics as metallurgy, petrochemistry, radar and agricultural implements. In 1979 it celebrated the 85th anniversary of Chairman Mao's birth by a major exhibition about his life. (Barc 79)

Children's services are conducted for young people between the ages of 8 to 18.

The library organization in Shanghai can serve as an illustration of how the public library network is organized. There are 10 districts in the city and 10 counties, and each of them has a district or county library. Below these are reading rooms in the people's communes (rural) and neighbourhoods (urban). These reading rooms in the neighbourhoods work independently from the larger libraries, but receive some technical support and assistance through the book mobiles that reach out to 'the grass roots level'.

Many of the city libraries, such as those in Hebei, Zhongjiang, Liaoning and Zhejiang were set up early in the century and they have collections of more than one million books.

1.2 University and school libraries

University libraries

All institutions of higher learning have libraries.

China has for long favoured the central library concept, and besides the central collection there are subject libraries dispersed in the major teaching departments around the university campus. In 1958 the total number of university libraries was 229 and it is fair to believe that there has not been much increase in that number because in general the universities suffered greatly under the Gang of Four with budgets being severely curtailed. Since 1977 there has been a steady increase in allocations and an increasing number of volumes are now added to the university libraries. (Barc 79)

There are eight university libraries which have collections of more than one million volumes. The foremost are Beijing university with 3.7 million, Nanjing with 2.6, Wuhan with 1.9 and Fudan with 1.6. There are eighteen more university libraries which have a stock over half a million volumes, and about 50 have more than 300,000 volumes. Most of the libraries seem to be overcrowded and, like Nanjing, there are plans for new extensions.

There is a steady lack of trained librarians in most university libraries. One of the major libraries had only one graduate from the Beijing Library School, and the rest of the qualified staff were graduates in foreign languages or other subjects than librarianship. Older librarians may have studied by correspondence up until 1966. After that time the political leaders paid little attention to the development of libraries in universities and colleges. In the "Twelve-Year-Programme of the Development of Higher Education" libraries are not even mentioned. Instead it stressed the need for establishing an increasing number of universities, even if there was no allocations for teaching facilities or libraries. (Wang 77)

From 1979 there has been an increased number of library schools in the universities. Wuhan and Beijing used to be the only two schools in the country. Now Fudan and Nanjing along with 16 other institutions of higher learning are opening schools to meet the nation's need for trained librarians. Reader training and reference service is practically unknown, but there is a growing awareness about the need for such services.

The Chinese Government has asked Unesco to promote the training and education of specialists in information users' education. A first Unesco seminar with international consultants and sponsored by France was held in September 1979. It primarily dealt with the new technology and how computerized methods could be applied in a traditional environment. Forty researchers, technicians and teachers coming from thirtyone units, including scientific and technical information institutes, libraries and universities were trained. The course was organized by Professor Wladimir Slamecka of Georgia Institute of Technology. (Info 1979)

China as a memberstate of Unesco has established a National Commission, which means that it will get encouragement from Unesco and will be involved in meetings and joint groups. Chinese permanent delegates at Unesco are Mr Wang Kuang-hua, consultant, and Mrs Cheng, secretary. In addition to the permanent delegates two specialists from China, Messrs Kang Feng, Deputy Director of ISTIC, and Zhou Shu-sen, attended the Unisist II meeting in Paris in May 1979. (Pers 79)

School libraries

As mentioned above about the Shanghai Public Library, most public libraries also serve the young people. Besides

in Shanghai, there are libraries in the so called Children's Palaces holding 25,000 books to supplement the library services to the primary school children in the local district.

The school libraries are generally housed in one or more classrooms. The Suzhou Middle School of Jiangsu Province has a 900-year old history, and in 1966 its collections ranged around 100,000 books. Of these 80,000 were lost during faction fighting at the time of the Cultural Revolution when they were removed over one night. Since then 30,000 books have been added, thus bringing the collection up to 50,000.

Teachers can borrow any books on their own subjects with limitations only to those in short supply. Students borrow books and novels in turns and the novels are divided into class sets. The reading room is open to staff all day, and to students a few hours in the afternoon.

The school libraries are financed by the Education Bureau of the Municipal Government. In the Wuhan province the school librarians meet regularly in order to develop a co-operative library network. (Barc 79)

1.3 Research libraries

The Library of the Chinese Academy of Sciences is a 'post liberation' establishment from the year 1951, two years after the Chinese Communist Party came into power. The academy is located in Beijing where it has its central library. It has also affiliations, e.g. in Shanghai where there also are good library facilities, and in its many research institutes libraries are also found. The central library in Beijing co-ordinates

the network of libraries. The total collections of the library network exceeds 4.5 million works in both Chinese and foreign languages.

The development of scientific information in the Academy has been a matter of first priority. Collection building has been strong in the areas of natural and social sciences, with a major commitment to the natural sciences, balancing the social sciences collection of the National Library. The library of the Academy participates in the nationwide union catalogue maintained in the National Library by sending cards of its acquisitions. In contrast to the National Library, which introduced a new classification scheme in 1975, the Academy has its own classification which is used by over a thousand research institutions and university libraries.

Following the Soviet pattern to achieve the maximum coverage of world information resources in the most economic way, the Academy in 1956 established the counterpart to VINITI, namely the Institute of Scientific and Technical Information of China (ISTIC). However, since 1978 ISTIC has been upgraded under the National Commission of Science and Technology, so it is now organizationally on the same level as the Academy. ISTIC will, therefore, be treated separately below.

During the Cultural Revolution almost all foreign exchanges were cut off, but still the Academy could maintain som exchanges thanks to its English language journal "Scientia Sinica". Thus, its collection of foreign journals now exceeds 2000 titles.

Libraries are also maintained by other academies, such as the Academy of Social Sciences, the Agricultural

Academy, etc. Research libraries are also found in large research institutes under, for instance the Ministry of Geology, or research oriented agencies, such as Yangtze River Administration.

1.4 - 1.5 Trade Union libraries and factory libraries

During the 50's there was a rapid development of trade union libraries which at the end of 1958 exceeded 35,000. These libraries are rather unique for China as support to the trade unions in the ideological training of their staff members and workers. The All China Federation of Labor Unions published the 'Stipulations for Library Operation' which said that the basic task of a labor union library was: "using books, periodicals and newspapers to help staff members and workers learn Marxism-Leninism; interpreting national policies to them; helping them acquire knowledge about science, technology, literature and arts; raising their political, cultural and technological level; and educating and assisting them to join in the socialist construction of the nation". As the interest for ideological matters has levelled off, many libraries have faced the necessity of suspending their operations. (Wang 77)

On the other hand the large industrial enterprises have established libraries with main emphasis on reference material for research, but they also provide books and periodicals for political study, as is the case in Anshan Steel Inc. or in mining and chemical plants. No figures are given about their resources.

1.6 Military libraries

Much of basic and applied research in fields like nuclear

power or space, is carried out in military establishments which, for covering the information needs, have good library facilities. However, like all the countries in Southeast Asia, it is very difficult to get any information about their collections. The library staff comes to professional meetings and mix freely with their civilian colleagues, but they keep their own activities for themselves.

1.7 Other information agencies

The libraries mentioned above are not the only agencies which provide scientific and technical information to decisionmakers, scientists, students and the intelligent laymen. One of the main sources is the *Institute of Scientific and Technical Information of China* (ISTIC), which in 1956 was established as an institute within the Academy of Sciences, but now is an independent institute under the National Commission of Science and Technology.

ISTIC is currently receiving 7000 periodicals in foreign languages through exchange or by purchases. In the patent field it has exchange with 13 countries from which over 400,000 patents are received each year. It also receives 20,000 standards from over 50 countries.

The material is synthesized and disseminated by means of 21 abstract journals, six patent extract journals, and through state-of-the-art and trendreports in three fields by the following publications: Journal of foreign science and technology, Journal of foreign inventions, and Standards translation digest.

The principle of centralized processing is maintained,

even if an affiliation was set up in 1960 in Chongqing in the Sichuan province. ISTIC, which is located in the Northwestern suburbs of Beijing, employs at present around a thousand people. However, a new site more downtown has been decided upon, and a new building is in the planning stage. It can be foreseen that there will be an increase in the staff, especially when introducing the new technology.

It has good library facilities for the users, divided into:

1) a research library in science and technology containing periodical literature, technical reports, reference books and a large microfiche collection

2) a patent specifications library

3) standards library, and

4) a products specification library. Around six hundred can be accommodated, but because of the remote location the number of visitors a day is seldom over 300.

The referral service of ISTIC handles about 13,000 queries a year mostly by mail, and its reprographic service produces around 4 million photocopies annually. Most of the work in ISTIC is handled in the analysis and translation sections, and it is reckoned that basic sciences account for 30% and technology for 70% of the work.

The present activities to produce the secondary journals is handled manually, but ISTIC has established a new division for computerization and automation in three areas, (a) information retrieval, (b) photocomposition and (c) machine translation. It has also acquired a Japanese minicomputer in order to start up experimentation. Many countries have been approached by the new

director of ISTIC, who wants to send his staff to study tours both for the building programme and for the change to computerized methods. China has also approached Unesco in order to receive consultancy missions for the ISTIC development. (In fact the headlibrarian of the Royal Institute of Technology in Stockholm, Dr Stephan Schwarz, has agreed to a one month's mission).

1.8 The establishment of a library association

Already in 1956, the idea of establishing a library association was launched, but nothing came out of it. During the liberation and the Cultural Revolution there was no mentioning about it. First when sciences and education again were becoming realities, a new proposal in March 1978 that met with general approval was submitted by the National Library during the National Conference on Cataloguing of Rare Books in Nanjing.

Later, at the National Library Science Conference in 1979, around 200 delegates met for a first statutory meeting, and the Library Society* was formally established on August 1, 1979. The object of the society is to organize library research, promote a publication programme, enhance exchanges with foreign libraries, and to introduce new means and procedures in the libraries. (Chis 79)

An indication of the present interest in China for library matters was given at the above conference, where 174 papers were given about various library activities, such as basic theories of library science,

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*The officers of the Library Society in 1979 are:
President: Liu Jiping
General secretary: Bao Zhenxi
International contacts: Li Xunda
Editor: Huan Yusheng

classification, library buildings, standardization, modernization of librarianship, bibliographic research, editing, etc. The exhibition displayed over five hundred Chinese books and journals in the library field published since 1940, and over six hundred recent foreign books, i.e. not earlier than 1970.

The Library Society has announced its interest to participate in international gatherings, and it will send delegates to the IFLA Conference in Manila, Philippines, in August 1980. Similarly, the ISTIC has indicated its participation in the FID Congress in Copenhagen also in August 1980.

2. LIBRARY, DOCUMENTATION AND SCHOLARLY PUBLICATIONS IN THE HISTORICAL PERSPECTIVE

2.1 Implications of the Chinese characters on the present scientific and technical information

Many countries start to recognize that scientific and technical information (for short STI) represents a valuable asset or resource in the same way as labour, raw material and knowledge. By tradition, the exploitation of recorded knowledge has for millennia been regarded as important, many times even dangerous for the rulers, and especially so in China. Despite the important role the Chinese libraries are playing in the communication of international science and technology, what they were playing in the past is an interesting subject in order to understand their present state-of-the-art.

Already in 2400 B.C. the Chinese characters were

designed. It is supposed that there was cultural interaction between North China and Southeast Asia at the time of the Pan-p'o phase, i.e. around 4500 B.C., which shows the Chinese people's early insight in the importance of information exchange through communications. However, it took about 2000 years until the ruling emperor saw the importance of having the instrument for communication by the introduction of the Chinese characters. (Tsch 57, Chan 76)

At first, just simple strokes were used as an aid for the memory. Symbols then took pictographic form, representing for instance a stylized drawing of a tree or a heart inside the chest cavity, thus the script conveyed visual symbols for the things one talks about, conveying meaning instead of sound as in Latin script. The pictures could also indicate various abstract concepts as acts of events. The Chinese characters which denote concepts originate from the archaic ideographs. A 'document' consisted of many parallel carvings on a bamboo tablet, and if the tablet was broken lengthwise into two similar parts, it signified a 'contract', and each party took one part as evidence.

The invention of the characters made the written language the language of a great civilisation which has succeeded in being an impact on the culture of the whole Far East. It has also been instrumental for the communication processes of one of the most varied and rich scientific and literary cultures of the world. The merits of the Chinese script are, however, more on the practical than on the intellectual level, and the impact of it can hardly be overestimated. It was, and still is the universal language for scholarly work, disregarding local dialects and languages within the

whole China. It can be compared with the mediaeval usage of Latin in the western countries or the ubiquitous English language in a field like nuclear physics in modern time.

Its universality within China for scholarly work creates great intractability to changes. That means that the language barrier to western scholarly works expressed, for instance in English, results in problems which only can be solved by great translation efforts. The lack of language skilled people at present is a hindrance for making full use of western technology, which is easily accessible because of the transparency of the industrialized countries in the information field.

2.2. The library tradition - a summary

Despite the fact that only a few Zhou Dynasty texts (1122-221 B.C.) have been found by archeologist, we know that graphic records became increasingly important communication means during this feudal period. Archives were set up and maintained by the royal court and the nobility. The philosopher Lao Tzu has traditionally been recognized as China's first known archivist. (Wong 76). Unfortunately, we do not know much about how the archives operated, and we know nothing about the government's interest in centralized libraries. There were, however, two famous private collectors during this period: the philosopher Mo Ti, founder of Mohism, and the diplomat Su Ch'in.

The first emperor of the Qin dynasty (221-207 B.C.), Shih Huang Ti, ordered the burning of books which were inimical to the regime. In his intention to subdue the

nobility he wanted to eradicate the existing literature, especially the Confucian writings being the ideological background to the feudal system. Fortunately, not all of the documents were destroyed, because Hsiao Ho, one of his ministers, had collected many of the books before the burning. Hsiao Ho has also got the credit for building two archives. In one of these the first known bibliography and the first classified catalogue were produced, containing 603 titles and 13,219 volumes.

Shih Huang Ti was also in other ways a remarkable emperor. He unified China's belligerent states, standardized the monetary system, the units of measures and weights, for instance track gauge of chariots, and built a network of roads through the whole empire. He divided the country into government districts, and joined up the walls earlier built by the individual states, thus forming the Great Wall as protection against the threat from nomadic tribes to the North. During these immense construction projects he forced rich and influential people to move from the countryside to the capital. His awareness of the importance for people to communicate with the central government wherever they lived in this enormous country, made China a great power.

In ancient times books were stored in archives, usually attached to the government offices where the documents were produced. During the reign of the emperor Wu (140-87 B.C.) a central, imperial library was established where a wide range of documentary material was systematically acquired and stored.

A testimony of China's early technical competence is the invention of paper in 105 A.D., a thousand years

before it was introduced in Europe. (Borc 57). Every Chinese child knows the rhyme:

Ts'ang Chieh designed the characters
Ts'ai Lun devised the paper

In 483 A.D. a Chinese scholar was allowed to borrow 2,000 volumes from the imperial library, thus marking the first time a private citizen was granted loan privileges by an imperial library. From now on also Buddhist and Taoist books were included in the library catalogues. That was important as Buddhist works in particular had become markedly numerous. This was also the time when the famous Buddhist Grotto Library in Hopei was established. Here, the practice of carving recorded knowledge on stone was carried out on grand scale.

The Confucian Classics were carved on large stone tablets and placed outside the National Academy. During the centuries, the last time being in 1791-94 A.D., additional tables came to light. Taoist works were also preserved on stone, but it was the vast Buddhist scriptures which gave rise to the largest of these stone book collections. According to professor Tsien:

"During the sixth through the eleventh centuries carvings were made of more than 105 Buddhist canons in some 4,200,000 words on 7,137 stone steles, preserved in the mountain of Stone Sutras, southwest of Fangshan, Hopei."

This ancient stone library remains intact even today. (Tsue 62)

Bookprinting was known already in the sixth century. A printed paper strip dated 594, showing a dog, has been found. The oldest book in the world, the "Diamond Sutra", appeared in 868, and, after having been

forgotten for 900 years, was refound in 1907.

Blockprinted books were invented in the ninth century and, as this method greatly facilitated large editions, books were widely spread. The libraries grew and many books that otherwise might have been destroyed in the many wars and devastating book fires, were preserved because of being scattered around the country. This was also the time when the need of library catalogues was perceived.

In the sixtenth century a private book collector, Fan Ch´in, had a library that for future generations has served as a model for cataloguing and classification.

In the seventeenth century a Chinese dictionary in 36 volumes covering literature and science was prepared.

A great library project was the compilation of the Ssu-K´u Ch´üan-Shu, the "Four Treasure Library" during 1773-1782. An inventory was made of the imperial collections and efforts were also made to acquire a wide variety of materials from all over the empire. Persons who contributed large numbers of books were rewarded with sets of either an enormous encyclopedia or a phrase dictionary. There were also numerous private collections during this period.

The imperial collections were primarily used by the emperors and officials (the literati) and private collections were generally for the owners' own use. Students could use the academy libraries, but the masses, who also were largely illiterate, had no collections at their disposal. However, with the insight of the vital importance of education, libraries were essential.

Some years of importance:

1896 Li Tuan-fen submitted a proposal of spreading of schools, establishing of libraries in Beijing and in the provincial libraries.

1898 Some of the provincial academies were turned into modern schools and colleges.

1902 Lo Chen-yü advocated the establishment of libraries not only in the capitals, but also in small administrative districts. He further proposed that these libraries should acquire Japanese and Western books.

1905 The year when the traditional examination system was abolished the first provincial library was established in Hunan. Other new libraries followed.

1909 The first Chinese public library law was declared. It established the National Library, provided for public libraries in each provincial capital as well as also further library developments in prefectures and counties, and a number of provincial libraries were founded before the fall of the dynasty in 1911.

1915 The Ministry of Education set regulations governing establishment and operation of public libraries.

1916 The National Library became depository for one copy of each book copyrighted in China.

Certain restrictions - such as closed stacks, no circulation, inadequate housing and sometimes a request for a small fee - were placed on the use of most public library collections. But now, for the first time in China's history, millions of people were able to borrow books and other printed material.

1920 People's Educational Centres with books, magazines and newspapers were spread all over the country.

1929 A new National Library was founded by merging the old National Library with the Beijing Metropolitan Library, that was established in 1926.

1931 The new National Library of Beijing was completed.

2.3. Classification

At present no uniform cataloguing system is prevailing in China. Three different new systems have been in use since the start of the National Library and all of them are represented in the catalogue. Furthermore, the old Chinese classics are still classified after the old Si-bu system.

Particulars chronologically devised:

1) The Si-bu system from the third century B.C. As the name indicates, this system treats four (si) groups: classics, philosophy, history and literature.

   During the 12th century twelve sub-groups were developed and by the end of the 18th century a system with the continuous sub-grouping was standardized. A catalogue with green coloured covers for classics, red for history, blue for philosophy and brown for literature was created. The system then contained 99 classes and sub-classes and was the only one in use until the beginning of this century. It then became apparent that the foreign literature that reached China could not be classified.

2) The first modern system is the one used at Library of Congress in the US (LC), that was taken into use in 1907. It was modified in order to be serviceable both for Chinese and Western literature.

3) In 1953 a new independent Chinese system was established. All notations were made in figures. The number of classes was 17 and in some cases classification became very complicated. (Öhma 77)

4) After the cultural revolution this system was substituted by yet another one. It has mixed notations, the main divisions are denoted by capital letters, and subdivisions by figures. The number of main divisions is 5:

   1/ Marxism-Leninism and Mao Zedong's thoughts,
   2/ philosophy,
   3/ social science,
   4/ natural sciences and
   5/ general and miscellaneous.

These are then divided into 22 classes marked by capital letters from I to Z. To these classes there are sub-classes denoted by figures, further letters and/or arabic figures are added to the

letter marking the class. In this manner 40,000 classification units can be reached. (Lode 76) This new classification system was intended for use all over China.

The catalogue at the National Library is now somewhat confusing as same or similar marks at the same time denote several quite different categories, depending on the used system. (Ells 80) This produces disorder in the library stock, inventory takes time and affects the operation of the library. The result is often that books never reappear on the shelves.

Arrangements in depositories were earlier made in accordance with LC, but in 1975, when the new classification system should be used, both Chinese and Western collections were arranged after this method. (Tell 79)

Foreign books have an alphabetic as well as a systematic catalogue, and new Chinese books are now arranged alphabetically after the official transcription pinyin, instead of number of strokes as earlier was the habit.

The National Library takes care of some of the control-card production in China. Other libraries can order these cards indicating systematic numbers for the four classification systems, title transcribed into pinyin, etc. (Eide 77)

3. PRESENT STATE OF THE ART AS REFLECTED BY THE SITUATION BEFORE AND AFTER THE CULTURAL REVOLUTION

3.1 Review of growth of education

Mao Zedong's short treatise titled "Oppose Book Workshop" written in 1930, contradicted the Chinese inclination for 'bookish learning' that had been practised

over nearly 2000 years through the Neo Confucian system of learning. (Barc 79) Mao saw the need of practical analysis of problems in China and warned against simply reading. He communicated the idea of 'theory and practice'; people were encouraged to be doers rather than thinkers. Ideology and indoctrination played a prominent part in educational curricula.

This political and social situation imposed a drastic change in library operations, a type of social and cultural work that traditionally goes on in spite of political changes. Under the 'educational line' the library turned into a place where political ideology disseminated. The integral relationship between 'theory and practice' was institutionalised across China in all spheres of endeavour. Students applied their knowledge in action and converted their lessons into practice. They grew food crops, built irrigation channels and made chemicals for sale, to mention some actions. This approach was rather easy in science and technology, less easy in humanities and social sciences. These ideological issues had real impact on libraries and the professional tradition was ruined.

Library development started first from the Great Leap Forward in 1956. Ways of strengthening support to scientific research were discussed, active measures were taken and some preliminary improvements and achievements resulted. (Wang 77)

The Cultural Revolution brought still greater emphasis on student and worker participation, communist ideology and physical labour. As education before the Cultural Revolution to a high extent relied on Confucian ideologies, the reaction during the revolution was to

suppress 'bookish learning' at all cost. Universities were shut down, libraries were vandalized, professors were farmed out to hard labour in factories and on the countryside, foreign language teaching was prohibited and the flow of foreign exchanges was effectively shut off. (TheC 79) Politics took precedence over content, and knowledge was afflicted for the benefit of socialism.

During 1977 more orthodox standards in education, including the reintroduction of the examination system, were again accepted and China emerged from the dark age. Now the lost decade and the missing generation of scientists and technicians had to be compensated for.

Although physical labour still is promoted alongside book learning, the plan for higher education is to increase the number of college and university students. Practice is no longer stressed at the expense of theory. China is assessing the damage caused in science, education and culture between 1965 and 1975.

Far East Yearbook 1978-79 mentions the following figures for education:

	Estimated pupils 1975
Primary schools	150,000,000
Middle schools	45,000,000
Higher education	1,000,000

Other figures are given by Zhang Jingfu, Minister of Finance: (ChiA 79)

Enrollment of new students in	1978	400,000
-"-	1979	270,000-300,000
Total college enrollment	1979	950,000

Zhang Jingfu pointed out, however, that the number is too small for a country with about 1 billion inhabitants. Many more scientists, engineers and other specialists are

needed if China shall reach its goals. Shortage of material and teachers makes it impossible to increase the annual number of new students into institutions of higher education.

Another source mentions an enrollment of 290,000 new students in 1978. This figure is also said to display an increase with 12,000 from the previous year. (High 79)

To show the enrollment level during this century the following table is given: (Bern 79) Figures are given in million.

Year:	1912	1928	1946	1949	1965	1972	1977
Primary schools pupils	2.8	8.8	23.7	24	110	127	146
Middle schools	0.06	0.189	1.5	1.04	14	36.5	58
Higher schools	0.016 (1919)	0.035	0.155	0.117	0.695	0.2	0.584(?)

Hsinhua News in informing about an education conference reports that the total number of students now (1980) is 210 million. (Hs23 80)

All educational institutions have to prove themselves successful, efficient and necessary in order to maximize their grants. (ChiA 79) There are national and local key institutes on which the major part of the expenditures are spent. Such institutes are spread all over the country and work as models for schools and colleges in order to help improve teaching by rapidly producing trained personnel.

As an example one key institute of higher learning in Beijing, the Beijing Polytechnical Institute, can be mentioned. There tuition is free, students come from all

backgrounds and live in rent-free dormitories, have free medical service and, in the department of computer science for instance, they have to take 23 courses covering four years: seven of these courses are connected with computer hardware engineering, six with software engineering, five with computer system. There are also some courses in foreign languages and physical education. Students have to do experimental work connected with the subject in which they major and have to spend ten weeks working in a unit connected with that subject. After the graduation they get jobs by the state, each paid according to his work. The gaps between different wages are not big. The age limit is 30 allowing students who missed college during the revolution to enter. The college has 24 specialities and an enrollment of 1,720 students. (Chin 80)

Discussions on wages and equalitarianism have been held on different occasions. Chairman Hua has said that while wages should not be widely spread, equalitarianism should also be opposed. People can not be expected to be enthusiastic if the principle of more pay for more work is not used. (Kees 78) Vice Premier Fang Yi also stressed the importance of promotion according to abilities and deplored the habit of promotion according to rank and length of service."Independent thinking and free debate in academic affairs have always been the most important conditions for the professional growth of talented people", the Vice Premier also said. (HS15 80)

The plan for higher education is to increase the college and university students to 3* million by the year 1985.

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*Some sources mention 3,5 million

Eight year schooling in the rural areas and ten years in the cities should then also be compulsory. This rapid expansion of primary and secondary education will cause expectations for higher education that can not be complied with. How to increase the number of teachers and improve their ability will be a difficult problem to solve. (TheC 79)

Mr Gu Ming, Vice-Minister in Charge of the State Planning Commission, mentioned in an interview in July 1979 that a basic policy formulated by Mao and Zhou Enlai was to seek external assistance, trading with and learning from other countries. (Impo 79) Mao consistently stressed the need to implement the policy of "relying mainly on our own efforts while making external assistance subsidiary." China will now need teachers from abroad, specialists and scholars, to give both short and long term lectures.

A working conference on education was held in Peking in January 1980. (Hs23 80) Experience in educational work, present situation and policies for the future were on the agenda: The large educational network built during the last 30 years had resulted in the present 10 million educational workers and 210 million students.

Now a balance should be set between economic construction and expansion of education, as well as also between the different kinds of education. Standard of education should be raised at all levels.

The abilities of the intellectuals should be used, their enthusiasm mobilized, working conditions and livelihood improved. In order to realize the future

goals the level of teachers should be improved, teaching materials compiled and teaching equipment added.

All this will be expensive and difficult to accomplish as improvement in higher education has to slow down due to budgetary constraints. The modernizing of science comes prior to education. (ChiA 79) Science and technology have to be more firmly united to meet the needs of construction and production. Mr Fang Yi, vice minister for science and technology, said on a meeting in February 1979 at the National Academy of Sciences that China is still rather backward in the field of science and technology on the whole and it has to learn from foreign countries. (USCE 79)

The projected figure of 3 million students for college enrollment in 1985 may not be reached. If almost 6 million applicants then compete for about 300,000 university places, this will cause disappointment among the vast majority. Dissatisfaction among the secondary school educated young people having to look for employment in practical job must be expected. As elite education has been restored, the conflict between expectations and possibilities may result in a reconstruction of the educational programme.

Modern planning and organization are difficult in a society that for almost 30 years has been dependent on collective achievements. (TheC 79) Coordination is a major problem. As an example it can be mentioned, that fifteen months after an eight-year plan for a unified national programme for scientific development was drawn by the National Science Conference in March 1978, such a plan was asked for at the Fifth National People´s Congress in Beijing in June 1979.

3.2 The importance of radio and television

On August 1, 1979, Guangming Daily had a special column advising on an audio-visual education programme throughout the country. Teachers from 40 colleges and institutes from all parts of China attended a session in Lanzhou. A teaching programme by audio-visual education for use at Chinese universities and colleges was discussed. A national coordinating network of audio-visual education in foreign languages was also formed. Foreign language institutes in six big cities are to become sub-centres for their respective region. Apart from editing a journal about this kind of education, every participating institute should draw up an inventory of the materials they have at hand and help to supply the others with what they need. The education centre recommended the full use of existing material, such as film projectors and slides, instead of waiting for new video and television sets.

Translation problems affect the availability of reading material as many foreign works are not available in the Chinese language. Foreign language study works are accessible in the foreign language institutes. Development of radio, television and correspondence courses is commonly used to meet the demand for education, and there are daily programmes on the television in foreign languages, especially English. The Chinese take every opportunity to listen and learn, as it is widely realised that language training is vital.

The radio and television are organized as follows:

Radio

Central Broadcasting Administration, Beijing
Central People's Broadcasting Station, Beijing
5 relay stations broadcasting 1450 h/week
117 local stations
giving domestic service in:
Chinese, Cantonese, Tibetan, Tai, Amoy, Hakka, Fuzhou dialect, Kazakh, Uighur, Mongolian and Korean

and foreign service in:
Arabic, English, Esperanto, French, German, Indonesian, Italian, Japanese, Portuguese and Spanish.

In 1972 there were about 10 million radio licences.

Television

Central People's Television Broadcasting Section, Beijing
39 television stations
125 relay stations

In 1978 there were over 1 million television receivers. (FarE 79).

3.3. Training of librarians

Before May 1979 only the universities of Beijing and Wuhan gave traditional library education on a formal academic level of two years. Now all universities have courses for librarians. Fudan and Nanjing along with 16 other higher institutions are opening library schools to meet the urgent need of librarians. In early 1979 only 40 percent of the librarians had some library training and 14 percent had a science background.

The shortage of librarians with scientific specialities was specificly noted. (Barc 79) Most of the libraries in the institutions of higher education existed only by name, as only the increase of the number of universities and colleges was of importance for the communists. How to promote library work or improve the teaching quality was never mentioned.

Since just political engagement and not knowledge in librarianship was the required qualification for enlisting library staff, cultural level, age and professional competence varied largely. (Wang 77) To meet the emerging requirements of library education, five kinds of education have been established: (Barc 78)

1) The formal university education by a course of two years. The institutions use 'society as their laboratory', involving students in productive labour, i.e. students compile a book about basic library principles, then go to the countryside and help the local people to run a factory or a community library.

The library school at Wuhan University had in 1978 a staff of 30 involved in teaching 100 students. One of the following two professional courses is compulsory:

a) Compilation and usage of scientific publications, reference work, politics.

b) Introduction to library theory, acquisition and selection, classification.

The students also have to study foreign languages and Chinese classics.

2) Two years' correspondence course conducted by the National Library in Beijing. This is a nationwide given reading course with final examinations in Beijing.

Curriculum: Areas related to cataloguing, classification, materials organization and storage and readers' service. Students are encouraged to learn and apply theoretical principles in practice.

3) Short part-time courses covering one or two years. Participants combine theory-learning with practice on the spot, and are not allowed to give up their ordinary job. These courses are organized on the provincial level.

4) Extension courses of a few months for basic training. Manuals prepared by students are used as tools for instructing local people how to maintain small libraries.

5) Training or learning classes where instruction is concentrated on a specific topic depending upon needs. These classes are very brief in time. The period never requires any certain training, nor is any instruction method prescribed.

To hold seminars is another way of training librarians. (Cf 1.2)

The salary for librarians has for a long time been the same irrespective of educational background, and was in 1978 starting from 56 yuan/month. The average pay was 80 yuan/month. (A bicycle costs 140 yuan, a small TV set 200 yuan and food for a month 15 yuan/person.) (Symo 78)

In 1978 the librarians at the university libraries in Beijing and Wuhan no longer had to perform periods of manual work in factories or in the country as most intellectuals still had to do.

4. A BIBLIOMETRIC APPROACH

A fundamental problem in meeting the information needs of library users is one of defining and describing the nature and currency of resources actually used. Analysis of referencing pattern provides a description of material use that may address such questions as currency which can be expressed in obsolescence or immediacy, and kinds of materials used such as Chinese as opposed to foreign. (Craw 79)

In order to assess how Chinese scientists utilize their informational sources, a bibliometric study of the citation pattern has been made in a rapidly developing field, such as the computer science. For that purpose a newly started journal, the "Chinese Journal of Computers" (CJC) has been used, starting with its volume 1 (1978) and volume 2 (1979). The ages of the materials referenced are found in Table I.

For comparison, an international journal covering almost the same field has been used, namely the "Computer Physics Communication" (CPC), same years, see Table II.

In the case of CJC the range of reference years of importance is about 30 years, while the CPC goes back more than ten years more. That seems to show that obsolescence in this field takes on more than a decade earlier in China than internationally.

If the median publication year is used in order to estimate the advancement of the computer science in China vs. internationally, the following values are found:

Median publication year of citations

Journal	1978 vol.	1979 vol.
Chin. J of Computers	1972.4	1972.6
Computer Phys. Communication	1970.3	1973.7

that shows a steady advancement towards the research frontier in China, while the international journal jumps ahead.

The dependency upon international sources becomes pronounced between the years 1978 to 1979 which show more than a doubling in the number of foreign references, while those to Chinese sources remain constant. (Cf. Table I.) The increase in the immediacy factor is notable for the Chinese material, namely from 31 percent to the year 1978 in the 1978 volume, to 46 percent in the 1979 volume.

The predominance for foreign literature is shown by two more examples in Table III. More analyses of this kind would make it possible to assess how the Chinese in various fields open up towards the usage of Western literature.

TABLE I

AGES OF MATERIALS REFERENCED

Chinese Journal of Computers

Years	1978 volume (N=76) * References: Chinese literature Nos.	%	Cum.%	Foreign literature Nos.	%	Cum.%	1979 volume (N=125) References: Chinese literature Nos.	%	Cum.%	Foreign literature Nos.	%	Cum.%
1935-49	-	-	-	1	1,59	1,59	-	-	-	2	1,79	1,79
1950-59	1	7,70	7,70	11	17,46	19,05	-	-	-	2	1,79	3,58
1960-69	1	7,70	15,40	6	9,53	28,58	2	15,38	15,38	23	20,54	24,12
1970	1	7,70	23,10	2	3,17	31,75	1	7,70	23,08	9	8,04	32,16
1971	-	-	-	2	3,17	34,92	-	-	-	4	3,57	35,73
1972	-	-	-	7	11,11	46,03	1	7,70	30,78	12	10,71	46,44
1973	-	-	-	7	11,11	57,14	-	-	-	6	5,36	51,80
1974	3	23,05	46,15	8	12,70	69,84	2	15,38	46,16	15	13,39	65,19
1975	1	7,70	53,85	9	14,29	84,13	-	-	-	9	8,03	73,22
1976	1	7,70	61,55	8	12,70	96,83	-	-	-	17	15,18	88,40
1977	1	7,70	69,25	2	3,17	100	1	7,70	53,86	12	10,71	99,11
1978	4	30,75	100	-	-		6	46,14	100	1	0,89	100
	13		100	63		100	13		100	112		100

*There are further 8 references to foreign literature but without information about printing year.

TABLE II

AGES OF MATERIALS REFERENCED

Computer Physics Communication, Europhysics Journal*

Years	Period years	1978 volume (N=289) Numbers of ref.	% of ref.	Cumulative % of ref.	1979 volume (N=878) Numbers of ref.	% of ref.	Cumulative % of ref.
1928-39	12	3	1,0	1,0	5	0,6	0,6
1940-49	10	4	1,4	2,4	18	2,1	2,7
1950-59	10	29	10,0	12,4	43	4,9	7,6
1960-64	5	25	8,7	21,1	32	3,6	11,2
1965		14	4,8	25,9	24	2,7	13,9
1966		4	1,4	27,3	13	1,5	15,4
1967		16	5,5	32,8	25	2,8	18,2
1968		13	4,5	37,3	25	2,8	21,0
1969		14	4,8	42,1	34	3,9	24,9
1970		19	6,6	48,7	27	3,1	28,0
1971		15	5,2	53,9	47	5,4	33,4
1972		16	5,5	59,4	53	6,0	39,4
1973		26	9,0	68,4	45	5,1	44,5
1974		23	8,0	76,4	72	8,2	52,7
1975		22	7,6	84,0	102	11,6	64,3
1976		13	4,5	88,5	90	10,3	74,6
1977		25	8,7	97,2	90	10,3	84,9
1978		8	2,8	100	103	11,7	96,6
1979		-	-		30	3,4	100

*An International Journal devoted to computational physics and computer programmes physics, North Holland Publishing Co.

TABLE III

AGES OF MATERIALS REFERENCED

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	1975	1976	1977	1978	1976	1977	1978
Chinese literature	-	-	-	1	-	-	4
Foreign literature	1	1	7	6	1	5	17

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